

Updated Displays for the Cockpit of the Space Shuttle

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Ames Research Center has contributed to the Shuttle Upgrade Program by providing human factors guidance to astronauts, engineers, and programmers to ensure that these displays present complex information effectively. There have been dramatic advances in user interface design and display technology during the two decades that the Space Shuttle has been operating. Thus, NASA is in the process of redesigning the formats on the liquid crystal displays (LCDs) of the Space Shuttle cockpit to capitalize upon these advances.

The existing display formats in the Space Shuttle cockpit are limited in several ways. For example, the displays are primarily monochromatic, making it difficult for astronauts to locate and focus their attention on a critical piece of information, such as an off-nominal parameter. The proposed display formats include a systematic and logical use of color. Critical parameters (such as the status of a jet manifold) turn red when the value is off nominal. The letters representing status ("C" for a closed valve in this example) become a color singleton that draws the viewer's attention automatically.

Another limitation of the current displays is that they make only limited use of graphics. The proposed displays have expanded graphics to provide a closer match between the display and crewmembers' mental models of the system being depicted. For example, the proposed reaction control system display provides a graphic depiction of jet availability, enabling the crew to tell "at a glance" which jets can be fired. These improved display formats should give future Shuttle crews the capability to make better and more rapid decisions under off-nominal conditions, enhancing flight safety and crews' abilities to meet mission objectives.